



USSN 09/778,747  
TANIMOTO et al.

### REMARKS

Claims 1-4 are presently pending in the captioned application with claim 1 being amended.

Claim 1 has been amended to specify a particular occupying volume, calcining temperature and kind and/or amount of a alkali metal element. Claim 1 has also been amended to include the term "and" to further show that none of the claimed limitation are mutually exclusive. The amendments are supported at page 6, line 12 to page 7, line 17. No matter within the meaning of §132 is added by the amendments.

Accordingly, Applicant respectfully requests the Examiner to enter the indicated amendments and allow all claims pending in the presently pending application.

#### 1. Rejection of Claim 1 under 35 U.S.C. §112, second paragraph

The Office Action rejects claim 1 for failing to particularly point out and distinctly claim the present invention. The Office Action States:

A symbol "B" has been used in two different meanings: one is for bismuth, the other is an element selected from phosphorus, tellurium, and etc.: therefore, it is vague and indefinite. An appropriate correction is required.

A number of terms "occupying volume", "calcining temperature", and "amount of alkali metal element" are written. However, they are unspecified as to how much is for occupying the volume, what is the range of the temperature and is the amount of the alkali metal element. An appropriate correction is required.

Applicant has amended the symbol "B" of claim 1 to "Bi". Additionally, claim 1 has been amended to recite a particular amount of an occupying volume, a calcining temperature and an amount of alkali metal element.

Accordingly, Applicant respectfully submits that amended claim 1 particularly points out and distinctly claims the subject matter of the invention and requests the Examiner to reconsider and withdraw the rejection to claim 1 under §112, second paragraph.

**2. Rejection of Claims 1-4**  
**under 35 U.S.C. § 102(b)**

The Official Action states that claims 1-4 are rejected under 35 U.S.C. § 102(b) as being anticipated by WO 98/24746 ("Wada et al.") which is equivalent to U.S. 6,028,220. The Office Action states:

Wada et al discloses a process for the preparation of acrolein and acrylic acid by carrying out the vapor phase oxidation of propylene with molecular oxygen or a gas containing molecular oxygen using a fixed bed

multi-tubular reactor (see col. 1, lines 8-13). Furthermore, the reaction process for the production of acrolein and acrylic acid can be performed by introducing a mixture gas consisting of 1 to 10% by volume of propylene as the starting material (see col. 8, lines 26-29).

In the process, a plurality of oxidation catalysts having a composition of the following formula is employed:  $\text{Mo}_a\text{Bi}_b\text{Ni}_c\text{Co}_d\text{Fe}_f\text{Y}_g\text{Z}_h\text{O}_x$  where Mo, Bi, Ni, Co, and Fe represent molybdenum, bismuth, nickel, cobalt and iron, respectively; Y is at least one element selected from the group of tin, zinc, tungsten, manganese, magnesium, antimony and titanium; Z is at least one element selected from the group of potassium, rubidium, thallium, and cesium; a, b, c, d, f, g, h, and x represent the number of atoms of molybdenum, bismuth, nickel, cobalt, iron, Y, Z, and oxygen;  $a=12$ ,  $b=0.1$  to  $7$ ,  $c+d=0.5$  to  $20$ ,  $f=0.5$  to  $8$ ,  $g=0$  to  $2$ ,  $h=0$  to  $1$  and x is determined by the oxidized condition of each element (see col. 4, lines 13-29) in U.S. 6,028,220.

Moreover, the plurality of catalysts having different occupying volumes (see col. 2, lines 45-47) is set-up so as to form a catalyst layer into two or three parts depending on calcinations temperature and time and the plurality of catalysts with an amount of at least 20% by weight based on the sum of the supported catalyst (see col. 4, lines 40-41) in each of a plurality of reactions zones is arranged in such an order that the activity increases toward the outlet from the inlet of the material in the axial direction of the tube (see col. 8, lines 47-54). These are identical with the claims.

Applicant traverses the rejection because Wada et al. does not teach each and every claimed limitation of amended claim 1. In

particular, Wada et al. fails to disclose plural catalysts different from each other in occupying volume, calcining temperature and type of alkali metal element. The Examiner is prohibited from any inherency analysis in a 102(b) anticipation rejection.

Turning to the rule, the Federal Circuit has spoken clearly and at some length on the question of anticipation. Anticipation requires that **each and every** element of the claimed invention be disclosed in a **single** prior art reference. Verdegaal Bros. v. Union Oil Co. of California, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Those elements must be **expressly** disclosed as in the claim. In re Bond, 15 USPQ2d 1566 (Fed. Cir. 1990).

The prior art reference must also be enabling, thereby placing the allegedly disclosed matter in the possession of the public. In re Brown, 329 F.2d 1006, 1011, 241 USPQ 245, 249 (C.C.P.A. 1964). In order to accomplish this, the reference must be so particular and definite that from it alone, without experiment or the exertion of his own inventive skill, any person versed in the art to which it pertains could construct and use it. Id. at 250.

In the present application, amended claim 1 recites a process for producing acrolein and acrylic acid through vapor phase catalytic oxidation of propylene with molecular oxygen or molecular oxygen-containing gas using a fixed bed shell-and-tube reactor,

comprising plural kinds of catalysts which are formed of complex oxides of the composition expressed by a general formula (1):



wherein the plural kinds of catalysts are different from each other in

( $\alpha$ ) occupying volume, and

( $\beta$ ) calcining temperature and/or

( $\gamma$ ) kind and/or amount of the alkali metal element,

wherein the occupying volume ( $\alpha$ ) is prepared by varying the dimensions of the catalyst particles in a range of 3-15mm,

the calcining temperature ( $\beta$ ) is in a range of 300-650°C,

the alkali metal element ( $\gamma$ ) is prepared by varying the atomic number g in the general formula (I) within the range of 0.001-3, and

by dividing the catalyst layer in each of the reaction tubes into at least two layers in the axial direction of the tube, sequentially with said plural kinds of catalysts in such a manner that the catalytic activity increases from the starting gas inlet side toward the outlet side.

Wada et al., on the other hand, fails to teach or suggest each and every claimed limitation. In particular, Wada et al. fails to disclose plural catalysts different from each other in occupying volume, calcining temperature and type of alkali metal element.

Although Wada et al. discloses an occupying volume becoming smaller toward its outlet side from the inlet side of a reaction tube, nothing is disclosed regarding the calcining temperature or the type of the alkali metal element. Moreover, the disclosure stating that 20% by weight of the sum of the supported catalyst in Wada et al. is totally unrelated to the claimed dimensions of a catalyst particle within a range of 3-15 mm, and the claimed calcining temperature in the range of 300-650°C, and the claimed alkali metal element having an atomic number  $g$  in the range of 0.001-3.

The legal standard as stated by the court in Rowe v. Dror, is that a negative pregnant **cannot** be the basis for a anticipatory reference. 42 USPQ2d at 1561. Since there are no teachings with regard to the claimed limitations, a person of ordinary skill in the art would not have been enabled to make and use the claimed invention. Clearly, Wada et al. fails to affirmatively or even generically disclose the claimed limitations.

Accordingly, Applicants respectfully submit that the presently claimed invention is not anticipated by Wada et al. and respectfully request the Examiner to reconsider and withdraw the 102(b) rejection of claims 1-4.

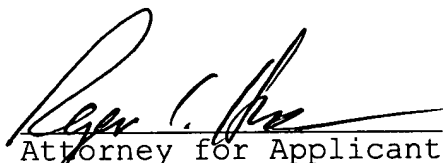
**CONCLUSION**

In light of the foregoing, Applicant submits that the application is now in condition for allowance. The Examiner is therefore respectfully requested to reconsider and withdraw the rejection of the pending claims and allow the pending claims. Favorable action with an early allowance of the claims pending is earnestly solicited.

Respectfully submitted,

**SHERMAN AND SHALLOWAY**

SHERMAN AND SHALLOWAY  
413 N. Washington Street  
Alexandria, Virginia 22314  
703-549-2282

  
Attorney for Applicants  
Roger C. Hahn  
Reg. No. 46,376



Attorney Docket No. S-2482  
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: ) Group Art Unit: 1625  
TANIMOTO ) Examiner: OH, TAYLOR V.  
Serial No. 09/778,747 )  
Filed: February 08, 2001 )  
For: **PROCESS FOR PRODUCING ACROLEIN AND ACRYLIC ACID**

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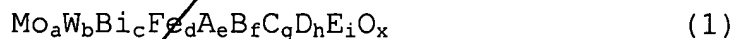
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Appendix A


Please amend the claims as indicated in the following  
marked-up copy of the claims.

B 1

1. (Once Amended) A process for producing acrolein and acrylic acid through vapor phase catalytic oxidation of propylene with molecular oxygen or molecular oxygen-containing gas using a fixed bed shell-and-tube reactor, which comprises preparing plural kinds of catalysts which are formed of complex oxides of the composition expressed by a general formula (1):



(wherein Mo is molybdenum; W is tungsten; [B] Bi is bismuth; Fe is iron; A is at least an element selected from cobalt and nickel; B is at least an element selected from phosphorus, tellurium, arsenic, boron, antimony, tin, cerium, niobium, lead, chromium, manganese and zinc; C is



at least an element selected from alkali metal elements; D is at least an element selected from alkaline earth metal elements; E is at least an element selected from silicon, aluminum, titanium and zirconium; and O is oxygen; a, b, c, d, e, f, g, h, i and x denote the atomic numbers of Mo, W, Bi, Fe, A, B, C, D, E and O, respectively, and where a is 12, b is 0-5, c is 0.1-10, d is 0.1-10, e is 1-20, f is 0-5, g is 0.001-3, h is 0-8, I is 0-30, and x is a numerical value which is determined depending on the extent of oxidation of each of the elements)

and which are different from each other in

( $\alpha$ ) occupying volume, and

( $\beta$ ) calcining temperature and/or

( $\gamma$ ) kind and/or amount of the alkali metal element,

the catalysts which are different from each other in occupying volume ( $\alpha$ ) being prepared by varying the dimensions of catalyst particles within the range of 3-15 mm,

the catalysts which are different from each other in calcining temperature being prepared by varying the final calcining temperature ( $\beta$ ) within the range of 300-650°C, and

the catalysts which are different from each other in amount of the alkali metal element ( $\gamma$ ) being prepared by

varying the atomic number g in the general formula (I)  
within the range of 0.001-3, and

filling the reaction zones provided by dividing the catalyst layer in each of the reaction tubes in the fixed bed shell-and-tube reactor into at least two layers in the axial direction of the tube, sequentially with said plural kinds of catalysts in such a manner that the catalytic activity increases from the starting gas inlet side toward the outlet side.



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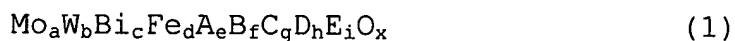
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Appendix B

Please amend the claims as indicated in the following  
marked-up copy of the claims.

B1 1. (Once Amended) A process for producing acrolein and acrylic acid through vapor phase catalytic oxidation of propylene with molecular oxygen or molecular oxygen-containing gas using a fixed bed shell-and-tube reactor, which comprises preparing plural kinds of catalysts which are formed of complex oxides of the composition expressed by a general formula (1):



(wherein Mo is molybdenum; W is tungsten; Bi is bismuth; Fe is iron; A is at least an element selected from cobalt and nickel; B is at least an element selected from phosphorus, tellurium, arsenic, boron, antimony, tin, cerium, niobium, lead, chromium, manganese and zinc; C is at least an

element selected from alkali metal elements; D is at least an element selected from alkaline earth metal elements; E is at least an element selected from silicon, aluminum, titanium and zirconium; and O is oxygen; a, b, c, d, e, f, g, h, i and x denote the atomic numbers of Mo, W, Bi, Fe, A, B, C, D, E and O, respectively, and where a is 12, b is 0-5, c is 0.1-10, d is 0.1-10, e is 1-20, f is 0-5, g is 0.001-3, h is 0-3, I is 0-30, and x is a numerical value which is determined depending on the extent of oxidation of each of the elements)

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and which are different from each other in

- (α) occupying volume, and
- (β) calcining temperature and/or
- (γ) kind and/or amount of the alkali metal element,

the catalysts which are different from each other in occupying volume (α) being prepared by varying the dimensions of catalyst particles within the range of 3-15 mm,

the catalysts which are different from each other in calcining temperature being prepared by varying the final calcining temperature (β) within the range of 300-650°C, and

the catalysts which are different from each other in amount of the alkali metal element (γ) being prepared by

varying the atomic number  $g$  in the general formula (I) within the range of 0.001-3, and

*Row 134*  
filling the reaction zones provided by dividing the catalyst layer in each of the reaction tubes in the fixed bed shell-and-tube reactor into at least two layers in the axial direction of the tube, sequentially with said plural kinds of catalysts in such a manner that the catalytic activity increases from the starting gas inlet side toward the outlet side.

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